

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

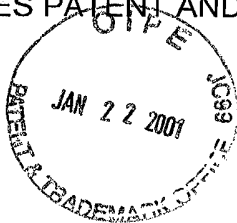
In re application of:

PYRHÖNEN

Serial No.: 09/269,754

Filing Date: April 7, 1999

For: AN ELECTRIC MACHINE CONSTRUCTION AND A METHOD FOR AN ELECTRIC MACHINE



Group Art Unit: 2834

Examiner: T. Lam

11/C
T. Steptoe
2/1

RESPONSE UNDER 37 C.F.R. § 1.121

Commissioner for Patents
Washington, D.C. 20231

January 22, 2001

Sir:

In response to the Office Action dated August 22, 2000, having been duly extended from November 22, 2000, until January 22, 2001, by the attached Petition for Extension of Time, please amend the above-identified application as set forth below.

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IN THE SPECIFICATION:

Please amend the specification as follows:

On page 1, line 2, delete "a" and insert --an electric machine-- in place thereof, and delete "according to the preamble of claim 1".

On page 1, line 4, please delete "according to the preamble of claim 8 to be" and insert --for an electric machine construction-- in place thereof.

On page 2, line 29, please delete "what is disclosed in appended claims 1...7 and especially by claim 1" and insert --an electric machine construction, comprising a stator space (9) defined by a shell (8) and end portions (6) at both ends of the shell (8), stator means and rotor means of the electric machine being disposed within said stator space,

ai
cont.

characterized in that cooling medium is arranged to be conducted into the stator space (9) defined by said shell and said end portion through at least one opening (14, 34) in said shell (8) and that the machine construction further comprises means (13, 20) for providing a suction for conducting said cooling medium by means of the suction into said stator space (9)-- in place thereof.

On page 2, lines 30-31, please delete "what is disclosed in appended claims 8...12 and especially by claim 8" and insert ~~a~~ method for an electric machine construction comprising a stator space (9) defined by a shell (8) and end portions (6) at the either ends of the shell (8), wherein stator means and rotor means of the electric machine are disposed within said stator space, characterized in that cooling medium is conducted into the stator space (9) defined by said shell and said end portions through at least one opening (14, 34) in said shell (8), wherein the conduction of said cooling medium occurs by means of a suction from said stator space (9)-- in place thereof.

REMARKS

The Office Action dated August 22, 2000, has been received and carefully noted. The period for response having been extended from November 22, 2000, until January 22, 2001, by the attached Petition for Extension of Time, the above amendments and the following remarks are submitted as a full and complete response thereto.

The specification has been amended to correct minor informalities therein. No new matter has been added by the above noted amendments. Therefore, claims 1-12 are respectfully submitted for consideration.

Claims 1-6 and 8-11 were rejected under 35 U.S.C. § 102(b) as being anticipated by Hokanson et al. (U.S. Patent No. 5,306,972, hereinafter "Hokanson"). Applicant

respectfully traverses this rejection, and submits that each of claims 1-6 and 8-11 recites subject matter which is neither disclosed nor suggested in the cited prior art.

Claim 1, upon which claims 2-7 are dependent, recites an electric machine construction comprising a stator space defined by a shell and end portions at both ends of the shell. The electric machine construction also comprises stator means and rotor means for the electric machine being disposed within the stator space characterized in that cooling medium is arranged to be conducted into the stator space through at least one opening in the shell. Furthermore, the electric machine construction comprises means for providing a suction for conducting the cooling medium by means of the suction into the stator space.

Claim 8, upon which claims 9-12 are dependent, recites a method for an electric construction comprising a stator space defined by a shell and end portions at the either ends of the shell. Stator means and rotor means of the electric machine are disposed within the stator space. Cooling medium is conducted into the stator space through at least one opening in the shell. The conduction of the cooling medium occurs by means of a suction from the stator space.

Accordingly, the present invention provides a cooling arrangement and a method for cooling , wherein the overall temperature of the machine construction does not increase, and which enables a uniform cooling arrangement in a symmetrical manner. The present invention further provides an arrangement wherein the coolant is drawn in an axial direction, by an active suction into the center spacing of the arrangement. Subsequently, the coolant is discharged at both ends of the center spacing. This provides the advantages of having the coolant flow only half the way of the arrangement, and thus remarkably

improves the cooling efficiency.

It is respectfully submitted that the prior art fails to disclose or suggest the elements of the presently pending claims and, therefore, fails to provide the critical and non-obvious advantages which are provided by the present invention.

Hokanson discloses an AC motor 46 including an outer housing 48, a rotor 50 and a stator 52. The stator 52 includes a plurality of electrical conductors 62 arranged in conventional phase windings and having end turns or endwindings 64 and 66. At one end of housing 48 there is an air inlet 68 for receiving cooling air indicated by arrows 70. At an opposite end of housing 48 is an air outlet 72, which outlet may comprise a plurality of circumferentially spaced holes through housing 48. Cooling air 70 enters inlet 68, flows through passages 74 in rotor 50 and passages 76 in stator 52, exiting through outlet 72. An annular air deflector 78 is formed at the end of rotor 50 adjacent end turns 64. The air deflector 78 assures that at least some of the cooling air 70 passes over or through end turns 64.

In other words, Hokanson discloses in Figures 6 and 7a, a machine where air is conducted into a stator space at one end of the machine, after which the coolant is conducted along the entire length of the rotor shaft to the opposite end of the machine where it is finally discharged.

Upon review and consideration of Hokanson, Applicant respectfully submits that each and every element recited in claims 1 and 8 of the present application is neither disclosed nor suggested by the cited prior art. In particular, Applicant respectfully submits that Hokanson fails to disclose or suggest the limitation of "cooling medium ... arranged to be conducted into the stator space (9) defined by said shell and said end portions through at

least one opening (14, 34) in said shell (8)." The present invention provides at least one cooling medium inlet opening (14, 34) in the shell 8 and is positioned between the ends of the rotor means 20. Specifically, the present invention shows one inlet centrally located between the ends of rotor 20 and two other coolant inlet openings positioned at opposite ends of the rotor 20, while outlet openings 12 are arranged at both ends of the shell 8. The present invention clearly allows coolant to enter centrally through the central inlet and exit at both ends of the shell. In contrast however, Hokanson merely shows that the air inlet is arranged at one end portion of shell (48, referred to as "AIR IN") while the outlet is arranged at the opposite end (referred to as "AIR OUT"). In fact, Hokanson illustrates in Figures 6 and 7a that coolant flows in at one end and out at an opposite end of the shell. Although Hokanson appears to disclose a stationary air deflector 78 which redirects air passages through the end turns 64 while the remainder passes over and around the end turns, thus assuring that the cooling air contacts the end turns 64, Applicant nevertheless submits that Hokanson fails to disclose or suggest "cooling medium ... arranged to be conducted into the stator space (9) defined by said shell and said end portions through at least one opening (14, 34) in said shell (8)."

Applicant further submits that Hokanson fails to disclose or suggest the limitation of a "means (13) for providing a suction for conducting said cooling medium by means of the suction into said stator space (9)." Applicant respectfully submits that means 13 is located at both end portions 6 of the stator space 9 for providing suction to draw cooling medium into the stator space 9. A negative pressure or partial vacuum can be achieved at the ends of the space defined by the shell 8 and end flanges 6 with suction means 13. In contrast, nowhere does Hokanson show such suction means 13 for maintaining any

negative pressure inside the housing and therefore, Hokanson fails to specifically disclose or suggest "providing a suction for conducting said cooling medium by means of the suction into said stator space (9)." Although Hokanson discloses an air deflector 78 and end turn 64, these two structural elements are not comparable or analogous to the suction means to draw "cooling medium ... into the stator space (9) as claimed in the present invention. Furthermore, Applicant respectfully submits that Hokanson does not show suction means located in the vicinity of both end portions of the stator. Accordingly, Applicant respectfully submits that Hokanson fails to disclose or suggest each and every element recited in claims 1 and 8.

With regard to claims 2-6 and 9-11, Applicant submits that these claims recite subject matter that is neither disclosed nor suggested by Hokanson. In particular, each of claims 2-6 and 9-11 depend on claims 1 and 8, respectively. Therefore, they inherently incorporate each and every limitation recited within claims 1 and 8 therein. Thus, in view of Applicant's remarks above, Applicant submits that each of claims 2-6 and 9-11 also recite subject matter that is neither disclosed nor suggested by Hokanson.

Claims 7 and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hokanson et al. in view of Sheerin (U.S. Patent No. 5,844,333). In making this rejection, the Office Action took the position that Hokanson disclosed all of the features of the claimed invention except for showing a heat exchanger. Sheerin was cited as curing the deficiencies in Hokanson. Applicant respectfully traverses this rejection, and submits that each of claims 7 and 12 recites subject matter that is neither disclosed nor suggested in the cited prior art.

Sheerin discloses a device and method for cooling a motor. A motor 100 is

disposed in an enclosed motor frame 20. Sheerin discloses an ambient air fan 44 with a motor drive shaft 58. Disposed within enclosure 96 is a first air-to-air heat exchanger 24 having a plurality of coolant tubes 28. A first heat exchange 24 is disposed above a first end of motor 100 with coolant tubes 28 extending substantially transverse to the longitudinal axis of drive shaft 58. Also disposed within enclosure 96 is a second air-to-air heat exchanger 26 having a plurality of coolant tubes 34. The second heat exchanger 26 is disposed above a second, opposed end of motor 100 with coolant tubes 34 extending substantially transversed to the longitudinal axis of drive shaft 58.

Applicant respectfully submits that Sheerin fails to disclose or suggest the limitation of "cooling medium ... arranged to be conducted into the stator space (9) defined by said shell and said end portions through at least one opening (14, 34) in said shell (8)" and "means (13) for providing a suction for conducting said cooling medium by means of the suction into said stator space (9)" which are deficient in Hokanson. Even if Sheerin disclosed the above deficiencies in Hokanson (not admitted), Sheerin nevertheless fails to disclose or suggest "heat exchanger means (24) provided within a space (23) between the outer surface of the shell (8) and the outer housing for cooling of the cooling medium flow." Although Sheerin discloses heat exchangers 24 and 26, these heat exchangers 24 and 26 located in relation to the motor 100 is significantly different from the placement of the heat exchanger 24 in relation to the electric machine of the present invention. The heat exchangers 24 and 26 of Sheerin are positioned above and separate from the motor 100 rather than positioning the heat exchanger 24 "within a space (23) between the outer surface of the shell (8) and the outer housing for cooling of the cooling medium flow." Therefore, Applicant respectfully submits that Sheerin fails to cure the deficiencies that exit

in Hokanson since it fails to disclose or suggest "cooling medium ... arranged to be conducted into the stator space (9) defined by said shell and said end portions through at least one opening (14, 34) in said shell (8)," "means (13) for providing a suction for conducting said cooling medium by means of the suction into said stator space (9)," and "heat exchanger means (24) provided within a space (23) between the outer surface of the shell (8) and the outer housing for cooling of the cooling medium flow." Accordingly, Applicant submits that neither Hokanson nor Sheerin, alone or in combination, disclose or suggest each and every element recited in claims 7 and 12.

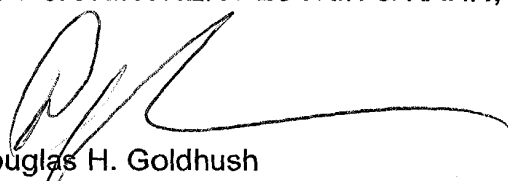
In view of the above, Applicant respectfully submits that claims 1-12, each recites subject matter that is neither disclosed nor suggested in the cited prior art. Applicant also submits that this subject matter is more than sufficient to render the claims non-obvious to a person of ordinary skill in the art and, therefore, respectfully requests that claims 1-12 be found allowable, and this application be passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact by phone the Applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event that this paper is not being timely filed, the Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension, together with any additional fees, may be charged to counsel's Deposit Account No. 01-2300.

Respectfully submitted,

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Enclosure: Petition for Extension of Time (2 months)